In the Claims:

1. (Previously Presented) A probe for application to a selected area of a subject's skin covering a body part, which selected area serves as a measurement site for measuring changes in the pulsatile arterial blood volume thereat, comprising:

a base for application to the selected area of the subject's skin at said measurement site;

a pressure applicator carried by said base for applying a static pressure to the subject's skin at said measurement site when said base is applied thereto;

and a sensor carried by said pressure applicator for sensing changes in the pulsatile arterial blood volume at said measurement site when the base is applied thereto;

said pressure applicator being designed to apply to said measurement site, when the base is applied thereto, a static pressure of a sufficient magnitude to partially unload the wall tension of, but not to occlude, the arteries at said measurement site; said pressure applicator being configured to substantially prevent venous distention and blood pooling at said measurement site by applying sufficient external counter pressure to effectively collapse the underlying veins and limit the local venous blood flow to the arterial throughput while permitting free venous drainage with respect to said measurement site through tissues surrounding said measurement site;

said probe being configured to be applied to a relatively restricted area of the subject's skin, to apply said static pressure to said relatively restricted area , which area does not completely encircle the body part at said measurement site, said pressure applicator occupying a relatively small fraction of the surface perimeter of the respective body part at said measurement site, to thereby permit free venous drainage from said

measurement site via a wide region of unrestricted passageways surrounding the measurement site.

2. (Cancelled)

3. (Original) The probe according to Claim 1, wherein said pressure applicator applies to said measurement site a static pressure which is above the subject's local venous pressure and slightly below the subject's diastolic blood pressure.

4. (Original) The probe according to Claim 1, wherein said pressure applicator comprises a fluid chamber and an external source of fluid for applying said static pressure to said measurement site.

5. (Original) The probe according to Claim 1, wherein said pressure applicator comprises a fluid chamber with at least one elastic wall constructed to utilize Laplace's law and including a self–contained fluid for applying said static pressure to said measurement site such that the level of pressure applied by said probe is substantially unaffected by the mechanical characteristics of the underlying tissues.

6. (Original) The probe according to Claim 1, wherein said pressure applicator comprises a chamber including a spring therein for applying said static pressure to said measurement site.

7. (Original) The probe according to Claim 6, wherein said spring for applying said static pressure to said measurement site is of a relatively large uncompressed length such that the effective pressure generated by it when it is compressed is substantially unaffected by relatively small variations in compressed length due to the mechanical characteristics of the underlying tissues.

8. (Original) The probe according to Claim 1, wherein said pressure applicator comprises a resilient elastomeric material for applying said static pressure to said measurement site.

9. (Original) The probe according to Claim 8, wherein said resilient elastomeric material for applying said static pressure to said measurement site is of a relatively large uncompressed length such that the effective pressure generated by it, when it is compressed, is substantially unaffected by relatively small variations in compressed length due to the mechanical characteristics of the underlying tissues.

10. (Original) The probe according to Claim 1, wherein said base is of a relatively non–stretchable material and carries said pressure applicator and sensor at the center thereof.

11. (Currently Amended) The probe according to Claim 1, wherein said base includes an adhesive layer ~~on its surface facing the pressure applicator and sensor~~ for adhering the base to the subject's skin at the measurement site.

12. (Original) The probe according to Claim 1, wherein said probe includes an optical sensor for sensing the blood oxygen saturation level.

13. (Original) The probe according to Claim 12, wherein said probe also includes an electrode for sensing an electrical potential such as the electrocardiograph (ECG) signal of the subject.

14. (Original) The probe according to Claim 1, wherein said probe also includes an electrode for sensing an electrical potential such as the electrocardiograph (ECG) signal of the subject.

15. (Original) The probe according to Claim 1, wherein said probe also includes an acoustic sensor for sensing a sound signal of the subject.

16. (Original) The probe according to Claim 12, wherein said probe also includes an acoustic sensor for sensing a sound signal of the subject.

17. (Original) The probe according to Claim 1, in combination with a clamping device for applying a clamping force to said base of the probe when applied to said measurement site, and a counter–force to the respective body part of the subject at the opposite side of said measurement site.

18. (Original) Apparatus for detecting and indicating a medical condition or a change in physiological state of a subject, comprising:

a probe according to Claim 1 for application to a measurement site on the subject's skin and for producing an output corresponding to measured changes in the pulsatile arterial blood volume thereat;

and a data processor system for utilizing said measured changes to detect and indicate a medical condition or change in physiological state of the subject.

19. (Original) The apparatus according to Claim 18, wherein said data processor system utilizes said measured changes in pulsatile arterial volume to indicate the peripheral arterial tone of the subject.

20. (Original) The apparatus according to Claim 18, wherein said data processor system utilizes said measured changes in pulsatile arterial volume to indicate changes in the systemic blood pressure of the subject.

21. (Original) The apparatus according to Claim 18, wherein said data processor system utilizes said measured changes to indicate the pulse rate of the subject.

22. (Original) The apparatus according to Claim 18, wherein said data processor system utilizes said measured changes in the pulsatile arterial blood volume to indicate the level of vascular tone at the measurement site.

23. (Original) The apparatus according to Claim 18, wherein said sensor is an optical sensor, and said data processor system utilizes said measured changes in pulsatile arterial volume to produce a measurement of the oxygen saturation level of the blood.

24. (Currently Amended) The apparatus according to Claim 18, wherein said apparatus further comprises at least one additional probe, ~~according to Claim 1~~ for application to at least one additional measurement site on the subject's skin and for measuring changes in the pulsatile arterial blood volume thereat;

said at least one additional probe comprising a base for application to the selected area of the subject's skin at said measurement site; a pressure applicator carried by said base for applying a static pressure to the subject's skin at said measurement site when said base is applied thereto; and a sensor carried by said pressure applicator for sensing changes in the pulsatile arterial blood volume at said measurement site when the base is applied thereto;

said pressure applicator being designed to apply to said measurement site, when the base is applied thereto, a static pressure of a sufficient magnitude to partially unload the wall tension of, but not to occlude, the arteries at said measurement site;

said pressure applicator being configured to substantially prevent venous distention and blood pooling at said measurement site by applying sufficient external counter pressure to effectively collapse the underlying veins and limit the local venous

blood flow to the arterial throughput while permitting free venous drainage with respect to said measurement site through tissues surrounding said measurement site;

said probe being configured to be applied to a relatively restricted area of the subject's skin, to apply said static pressure to said relatively restricted area , which area does not completely encircle the body part at said measurement site;

said pressure applicator occupying a relatively small fraction of the surface perimeter of the respective body part at said measurement site, to thereby permit free venous drainage from said measurement site via a wide region of unrestricted passageways surrounding the measurement site;

said data processor system utilizing the measured changes of both of said probes for detecting and indicating the medical condition or the change in physiological state of the subject.

25. (Original) The apparatus according to Claim 24, wherein said probes are constructed for application to measurement sites in which the vascular beds thereat have different levels of autonomic nervous system activity or responsiveness.

26. (Original) The apparatus according to Claim 24, wherein said probes are constructed for application to measurement sites in which the vascular beds thereat are mainly comprised of conduit (conducting) arteries and microcirculatory vascular beds respectively.

27. (Original) The apparatus according to Claim 24, wherein said probes are constructed for application to measurement sites in which the pulsatile volume of the vascular beds are respectively predominantly affected by autonomic nervous system activity or by the level of systemic blood pressure.

28. (Original) The apparatus according to Claim 24, wherein said probes are constructed for application to measurement sites in which the pulsatile volume of the vascular beds are respectively predominantly affected by autonomic nervous system activity or by the level of systemic blood pressure wherein said data processor system compares the outputs of said probes to indicate the medical condition or change in physiological state of the subject.

29. (Original) The apparatus according to Claim 24, wherein said probes are constructed for application to measurement sites in which the pulsatile volume of the vascular beds are unequally affected by autonomic nervous system activity; and wherein said data processor compares the outputs of said probes to indicate the medical condition or change in physiological state of the subject.

30. (Original) The apparatus according to Claim 24, wherein said probes are constructed for application to measurement sites in which pulsatile volume of the vascular beds are respectively predominantly affected by unequal levels of autonomic nervous system activity; and wherein said data processor compares the outputs of said probes to indicate the medical condition or change in physiological state of the subject.

31. (Original) The apparatus according to Claim 24, wherein said probes are constructed for application to two or more measurement sites at a known distance from each other; and wherein said data processor system utilizes the outputs of said probes for indicating the pulse propagation velocity.

32. (Original) The apparatus according to Claim 24, wherein at least one of said probes includes an electrode for sensing the electrocardiograph (ECG) signal of a subject; and wherein said data processor system utilizes said measured changes in the pulsatile

arterial blood volume, and said ECG signal, to determine the pulse transit time and/or pulse propagation velocity.

33. (Original) A method of detecting and indicating a medical condition or change in physiological state of a subject, comprising:

applying a probe according to Claim 1 to a measurement site on the subject's skin for measuring changes in the pulsatile arterial blood volume thereat;

and utilizing said measured changes to detect and indicate a medical condition or change in physiological state of the subject.

34. (Original) The method according to Claim 33, wherein said probe is applied to a relatively restricted area of the subject's skin substantially overlying a medium to large sized artery.

35. (Previously Presented) The method according to Claim 33, wherein said probe is applied to arterio–venous shunt rich palmar surfaces of the hand or plantar surfaces of the foot.

36. (Previously Presented) The method according to Claim 35, wherein said probe is also applied to a corresponding arterio–venous shunt poor dorsal aspects of the hand or foot.

37. (Previously Presented) The method according to Claim 33, wherein said probe is applied to a relatively restricted area of the subject's skin on the subject's forehead.

38. (Previously Presented) The method according to Claim 33, wherein said probe is applied to a relatively restricted area of the subject's skin on a limb of the subject.

39. (Original) The method according to Claim 33, wherein said probe is applied to a relatively restricted area of the subject's skin at the subject's wrist.

40. (Original) The method according to Claim 33, wherein said probe is applied to a relatively restricted area of the subject's skin on the palm of the subject's hand or on the sole of the subject's foot.

41. (Original) The method according to Claim 33, wherein said sensor is an optical sensor, and said data processor system utilizes said measured changes in pulsatile arterial volume to produce a measurement of the oxygen saturation level of the blood.

42. (Original) The method according to Claim 33, wherein said probe is applied over a superficial artery for evaluating an endothelial function of the subject.

43. (Original) The method according to Claim 33, wherein said probe is applied over a skin region predominantly containing microvascular blood vessels for evaluating an endothelial function of the subject.

44. (Original) The method according to Claim 33, wherein at least one additional probe is applied to at least an additional measurement site on the subject's skin for measuring the pulsatile arterial blood volume thereat, the measurement of the additional probe(s) at the additional measurement site(s) also being utilized for detecting and indicating the medical condition or change in physiological state of the subject.

45. (Original) The method according to Claim 44, wherein said probes are applied to measurement sites in which the vascular beds thereat have different levels of reactivity to autonomic stimulation.

46. (Original) The method according to Claim 44, wherein said probes are applied to measurement sites in which the vascular beds thereof have different responses to reflex eliciting events.

47. (Previously Presented) The method according to Claim 44, wherein at least two of said probes respectively include an electrode for sensing the electrocardiograph (ECG) signal of the subject, and wherein said probes are applied to measurement sites at a known distance from each other and the measured changes of said probes are utilized for indicating the pulse transit time and the pulse propagation velocity.

48. (Previously Presented) The method according to Claim 44, wherein one of said probes is applied to a subject's body surface overlying a superficial conducting artery, and another of said probes is applied to a subject's body surface overlying a predominantly microcirculatory vascular bed.

49. (Previously Presented) The probe of Claim 1, wherein the sensing modality for sensing changes in the pulsatile arterial blood volume at said measurement site is the pressure change within said pressure applicator.

50. (Original) The probe of Claim 1, wherein a multiplicity of different sensors are used for sensing changes in the pulsatile arterial blood volume at said measurement site.

51. (Original) The method according to Claim 33, wherein said probe is applied over a skin region predominantly containing microvascular blood vessels for deriving a signal for biofeedback input.

52. (Original) The method according to Claim 33, wherein said probe is applied over a skin region overlying a superficial conducting artery for deriving a signal for biofeedback input.

53. (Original) The method according to Claim 33, wherein said probe is applied over a skin region predominantly containing microvascular blood vessels for deriving a signal in response to a physical, pharmacological agent or mental stressor.

54. (Original) The method according to Claim 33, wherein said probe is applied over a skin region overlying a superficial conducting artery for deriving a signal in response to a physical, pharmacological agent or mental stressor or stimulus.

55. (Original) The method recited in Claim 33, wherein said detecting comprises viewing time–course of a peripheral arterial tone signal.

56. (Original) The method recited in Claim 33, wherein said detecting comprises viewing variations in a peripheral arterial tone signal.

57. (Original) The method of Claim 44, wherein a multiplicity of different sensors are used for detecting changes in the pulsatile arterial blood volume at said measurement sites.

58. (Original) The method of Claim 44, wherein detecting of changes in the pulsatile arterial blood volume at said measurement sites is performed for deriving a signal for biofeedback input.

59. (Original) The method of Claim 44, wherein detecting of changes in the pulsatile arterial blood volume at said measurement sites is performed for deriving a signal in response to a physical, pharmacological agent or mental stressor or stimulus.

60. (Original) The method of Claim 44, wherein detecting changes in the pulsatile arterial blood volume at said measurement sites comprises viewing time–course of a peripheral arterial tone signal.

61. (Original) The method of Claim 45, wherein detecting changes in the pulsatile arterial blood volume at said measurement sites comprises viewing variations in a peripheral arterial tone signal.

62. (Original) The probe according to Claim 1, wherein pressure applied by said pressure applicator extends in area beyond the region of said sensor to extend the effective boundary of the pressure field overlying the sensing region, to substantially prevent venous distention and blood pooling at said measurement site and extended effective boundary of the pressure field by applying sufficient external counter pressure to effectively collapse the underlying veins and limit the local venous blood flow to the arterial throughput while permitting free venous drainage with respect to said measurement site through tissues surrounding said measurement site.

63. (Original) The apparatus according to Claim 18, further including a sleep/wake detector, wherein said data processor system utilizes said measured changes to indicate the sleep/wake status of the subject.